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PRESIDENTIAL APPOINTMENTS TO THE SUPREME COURT

Adding Systematic Explanation to Probabilistic Description

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Three articles, published in the leading journals of three disciplines over the last five decades, have each used the Poisson probability distribution to help describe the frequency with which presidents were able to appoint United States Supreme Court Justices. This work challenges these previous findings with a new model of Court appointments. The analysis demonstrates that the number of appointments a president can expect to make in a given year is a function of existing measurable variables.

Scholars publishing in the leading journals of three disciplines over the last five decades, have each used the Poisson probability distribution to help describe the frequency with which presidents were able to appoint United States Supreme Court Justices (Wallis, 1936; Callen and Leidecker, 1971; Ulmer, 1982). Useful findings were reported in each study, but a central conclusion of all three was that “without denying that Supreme Court appointments are to some extent interdependent, the degree of interdependence seems so minimal that one may choose to ignore it” (Ulmer, 1982: 116). Furthermore, “a particular vacancy is equally likely to occur in any of the . . . years” (Wallis, 1936). These two conclusions—that Supreme Court appointments (1) are independent and (2) have an equal probability of occurrence for all years—are challenged in this article. They are important for at least two reasons.

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First, although "it is obviously impossible for a president-elect of the United States to measure [exactly] the burden which the various tasks of the presidency will impose upon him," it is also true that "predictions of the amount of labor entailed in the various duties, even though they cannot be made exactly, undoubtedly would yield to statistical . . . estimation" (Wallis, 1936). All three previous articles suggested that Supreme Court appointments are one of the potential presidential activities for which predictions might be possible and useful. For example, Ulmer (1982) argued that no one should have been surprised that President Carter made no Supreme Court appointments; indeed, according to Ulmer, Carter should have expected with 0.13 probability that he would have had no appointments over his four-year term. This estimation is important for academic purposes, but it should also help presidents make judgments about whom to appoint. For example, suppose a president wanted to reward one of his top assistants with a Supreme Court appointment (Edwin Meese?), but the president also wanted this person to work in the White House as long as possible. If a vacancy occurs one year after the inauguration, the relevant question that could be answered if these conclusions are correct is, "What is the probability that at least one additional vacancy will occur in the remaining three years?"¹

Second, the independence and equal probability of occurrence conclusions of previous research leads to the Poisson process as an underlying mathematical law that describes Supreme Court appointments. These findings may therefore demonstrate in yearly appointments "a law and order only dimly in evidence in the seeming chaos of" individual Court appointments (Callen and Leidecker, 1971: 1188). Their attractiveness thus stems from the apparent applicability of a mathematical law of nature (the Poisson process) to this important social science problem. Finding natural laws that apply to the social and political world have long been an implicit and sometimes explicit goal of positive social science. That a political law appears to have been found, in at least probabilistic form, is very exciting to some.

The argument of this article is that there are strong substantive

and methodological reasons to be skeptical of the conclusions that Supreme Court appointments are independent and have an equal probability of occurrence over all years. Previous authors' political understanding of the frequency of Supreme Court appointments rests almost exclusively on these two conclusions. By providing evidence that they are invalid, the approach in this article suggests a model of appointments that contrasts sharply with previous research. Whereas conventional wisdom describes appointments as a special type of random process, this article demonstrates that Supreme Court appointments are functions of both random *and* systematic factors. In the following sections, I describe the substantive reasons to distrust these previous findings, outline the statistical misinterpretations that led to them, provide a reanalysis of the appointments data supporting my systematic interpretation, and briefly discuss the findings and their theoretical implications.

POLITICAL SCIENCE MISINTERPRETATIONS

There are at least three reasons to believe that the expected number of appointments actually varies over the years. The second reason also questions the independence assumption.

First, as noted in all three articles, the number of seats on the Court has varied from a low of five, prior to 1807, to a high of ten during some of the civil war years.² It is implausible to argue that the same number of yearly retirements should be expected of a body of six members as one with ten. This is nevertheless what previous research assumed. There were some partial tests of this hypothesis, but a lack of statistical controls provides strong reasons to question the results.

Second, if there have recently been a relatively large number of retirements, the expected number of current appointments is surely less. At the extreme, even if all the justices were coincidentally to retire at once, the conventional wisdom would have the probability of an appointment the next year equal to that for all other years. This extreme case makes the point, but it is also

plausible to argue that marginal changes in past retirement should influence current retirement. If the argument in this paragraph is true, then it also contradicts the hypothesis that appointments in one year are independent of appointments in succeeding years.³

Third, an implied conclusion of the three articles is that exogenous events have no influence on Court vacancies. This may be the case at times, but it is unlikely over the long haul. For example, it is well known that the Supreme Court has played as much of a role in electoral realignments as have other American governmental institutions (Adamany, 1980). One way this role may get played is through changes in the opinions of the justices; another way is through generational replacement of the justices. Since individuals do not change their attitudes very often or very quickly, it is plausible to argue that replacement probably plays at least some role. The specific hypothesis here is that the justices have higher probabilities of retirement in times of political turmoil and realignment. Some justices may intentionally retire to make way for younger justices with more current attitudes and opinions; others may just tire of being at the center of rancorous political debate when the Court, and possibly their role on the Court, may be subject to increasing criticism. Similarly, after controlling for other factors, periods of calm should generally reduce the frequency of Supreme Court appointments.

Thus there are at least three substantive political reasons why the two presumptions of past research are implausible. I move now to the statistical misinterpretations that seemed to have also led to these incorrect conclusions about independence and equal probability of occurrence.

STATISTICAL MISINTERPRETATIONS

If Y_t denotes the *observed* number of appointments in year t , the assumption of a random Poisson process can be represented by this formula (Johnson and Kotz, 1969: chap. 4):

$$Pr(Y_t = y_t; \theta_t) = \frac{e^{-\theta_t} \theta_t^{y_t}}{y_t!} \quad [1]$$

where θ_t is the *expected* number of appointments in year t , $E(Y_t)$. For 1837-1932 (Wallis, 1936), for 1837-1970 (Callen and Leidecker, 1971), and for 1790-1980 (Ulmer, 1982), there is conclusive evidence that the yearly frequency of Supreme Court appointments closely follows the Poisson distribution in Equation 1. The question is exactly what implications may be validly drawn for political science research from this empirical finding. I make my point first by analogy.

Suppose there were a state lottery on Mondays and Thursdays. After a while, citizens of this state began to complain, since it appeared that the number 2 came up much more frequently on Mondays than Thursdays. Was the lottery fixed? To find out, a statistician was hired and asked to determine whether or not the results were random. If the statistician was interested in ascertaining whether or not the frequency of 2s was higher on Mondays than Thursdays, two means would be calculated and a difference in means (or equivalent regression) test would be performed (King, 1986). Since the data are surely distributed Poisson, this additional information (heteroskedasticity and a strongly skewed non-Normal distribution) would need to be included in the test.

This would be the correct way for the statistician to examine the fixed lottery hypothesis. But, suppose instead the statistician tested the hypothesis that the data were distributed Poisson. In this case, he or she would find evidence of a Poisson distribution *whether or not the lottery was fixed*. The reason has to do with Cramer's (1937) theorem.⁴ Of course, this finding has nothing whatsoever to do with the lottery being fixed.

Similarly, the three articles on Supreme Court appointments have demonstrated that these data are generated as random draws from a Poisson distribution, but they have neither demonstrated nor tested the hypothesis that the probability of a vacancy remains constant over all of American history. As was seen in the previous section, there are good reasons to believe otherwise.

Such is the motivation for a reanalysis of the Supreme Court appointments data: Strong substantive reasons, outlined in the previous section, lead to questioning the plausibility of the results of past research. Then, finding evidence of clear statistical misinterpretation in past research suggests an explanation for why these scholars came to these apparently incorrect conclusions. With a more appropriate model applied to these data in the next section, this article conducts the first real test, and presents the first contradictory findings, of these hypotheses.⁵

AN EXPONENTIAL POISSON REGRESSION MODEL OF SUPREME COURT APPOINTMENTS

To test these alternative ideas, I have collected an updated version of the same data as has been used before—the number of Supreme Court Appointments per year, 1790-1984. But, in addition, I have also collected data on several explanatory variables that fit the three categories of substantive explanation above. In combination with a model designed to meet the objections of the previous section on statistical misinterpretation, these variables will help to point toward a new understanding of Court appointments.

The dependent variable is the number of appointments (Y_t) per year ($t = 1790, \dots, 1984$). To measure appointments in previous years, I have calculated for each year the number of justices who left the Court in the previous six years ($PrevAppt_t$).⁶ The number of seats on the Supreme Court was also recorded for each year ($NSeats_t$).

To get at least some measure of exogenous influences on the Court, I use two indicators. Both are measures that correlate with realignment and electoral and political turmoil. They are also continuous indicators rather than dummy variables with arbitrary cutoffs indicating when realigning periods occurred. First, the proportional change in the percentage of the population who are military personnel on active duty is coded ($Military_t$). Indicators of military and international conflict have continually been

shown to influence many political phenomena (for example, Mueller, 1973). For example, it is likely that the probability of retirement from the Court was somewhat higher during the civil and world wars. This is not to say that if America goes to war then all the justices will leave the bench. Instead, military conflict is an available, albeit imperfect, indicator of political, social, and economic turmoil. Second, "The percent freshman in the House is an important variable because it measures the extent of electoral change. The higher the percent freshman, the greater the electoral change" (Brady et al., 1979). Thus I code *Fresh_t* as the percentage of members of the U.S. House of Representatives who were newly elected in the most recent election. I expect increases in both of these variables to yield increases in Supreme Court vacancies.

Since it has been quite clearly established that the dependent variable is distributed Poisson, a standard linear regression model is theoretically and statistically inappropriate. Problems would include bias, inefficiency, inconsistency, as well as the wrong functional form. These are technical statistical criteria, but in this case they have enormous substantive consequences. For these and other *event count* variables—those measured as nonnegative integers—the appropriate model is a form of the exponential Poisson regression (EPR) model (see King, forthcoming). This model begins with the assumption that the actual number of appointments in year *t* follows a Poisson distribution (Equation 1) with unobserved mean θ_t . The hypothesis that the probability appointment in each of the *n* years is the same as every other can then be written as $\theta_1 = \theta_2 = \theta_3 = \dots = \theta_n$. The independence hypothesis suggests that the expected number of events in year *t*, θ_t , does not depend on the actual number of events in the previous years, *PrevAppt_t*.

To test these assumptions, I do not require θ_t to be the same for all years, as did previous analyses. Indeed, estimating *n* of these θ s from only *n* Ys is surely impossible. To reduce the number of parameters to estimate, and to incorporate the hypotheses about measured explanations for variations in the unobserved expected appointments, θ_t , I allow θ_t to vary as a function of the explanatory variables mentioned above:

$$E(Y_t) \equiv \theta_t = \exp[\beta_0 + \beta_1 \ln(NSeats_t) + \beta_2 PrevAppt_t + \beta_3 Military_t + \beta_4 Fresh_t + \beta_5 Fresh_t^2] \quad [2]$$

Thus only six parameters need to be estimated, β_0, \dots, β_5 , an easily manageable statistical problem. Several other parts of this model also require discussion. First, $\epsilon_t = Y_t - \theta_t$ is assumed to be a set of independent Poisson random variables.⁷ This is *not* to say that the number of appointments (Y_t) are independent and identically distributed Poisson random variables. In fact, if any of the explanatory variables are shown to have an influence on Y_t , then this prior conventional wisdom will have been incorrect in this respect.

Second, the exponential form of the relationship implies that the influence of the explanatory variables on the number of appointments is not constant. It suggests that the "effort"—in terms of a change in an explanatory variable—needed to move the expected value of Y_t from (say) 0 to 1 is larger than the effort needed to move it from (say) 2 to 3. This is a standard assumption of EP regression, appropriate for all models that have an event count as a dependent variable. The problem with a linear model in this case is that it results in heteroskedasticity and (nonsensical) negative predicted numbers of events.

Third, both *Fresh* and *Fresh*² are included in this model. This (polynomial) specification allows for an increase in the proportion of freshmen to yield an increase in the expected number of vacancies, but it also lets this effect trail off as the proportion of freshmen gets very high. Allowing only an "exponential-linear" relationship in this case (that is, omitting *Fresh*² from equation 2), could result in unrealistically high predicted values for elections with very high turnover or could bias other estimates.

Fourth, the natural logarithm of the number of seats, $\ln(NSeats)$, is included instead of the raw number of seats. This is done since the original form of the relationship is probably:

$$\frac{E(Y_t)}{NSeats_t} = \exp(X\beta)$$

This is plausible, since it basically weights by the number of seats on the Court, using the proportion as the dependent variable. Algebraically, this equation is identical to Equation 2, with β_1 constrained to one. As described by King (forthcoming), it is harmless to free β_1 and estimate it as any other parameter.

Finally, it pays to review the hypotheses in light of this model. If any or all of β_1 , β_2 , β_3 , or β_4 and β_5 together are different from zero, then the conventional wisdom about the constancy of the expected number of Supreme Court appointments over all years is incorrect. In addition, if β_2 is different from zero, then the previous conclusions about the independence of appointments in different years is wrong. Specifically, I hypothesize that more seats should yield more appointments ($\beta_1 > 0$); previous appointments should decrease the frequency of current appointments ($\beta_2 < 0$); an increase in military conflict should increase retirements ($\beta_3 > 0$); and, an increase in the percentage freshman in the House should increase (at a decreasing rate) the frequency of appointments ($\beta_4 > 0$ and $\beta_5 < 0$). Although made plausible from the arguments in previous sections, each of these hypotheses is contrary to that implied in previous literature.

The statistical estimation of equation 2 with the data described above yields the results presented in Table 1. Note first that the sign of every coefficient is in the hypothesized direction. Furthermore, an evaluation of the standard errors indicates relatively precise results. From the last column, it appears safe to conclude (at conventional significance levels) that all of the estimates are different from zero in the correct direction. The chi-square test at the bottom of the Table indicates in summary fashion the strong support for the hypotheses in this article.

Thus previous research is probably incorrect in concluding that the frequency of appointments in any one year is independent of succeeding years. Specifically, these results indicate that four more justices being appointed in the previous six years results in $(-0.2184 \times 4 \approx -0.9)$ nearly one less justice being appointed this year, after the effects of the other variables in the equation have been taken into account.⁸

This work also suggests that the three previous articles on this subject were incorrect in arguing that the mean number of

TABLE 1
Exponential Poisson Regression Model of
U.S. Supreme Court Appointments

Table 1: An Exponential Poisson Regression Model of U.S. Supreme Court Appointments			
Variable	$\hat{\beta}$	Standard Error	Pr($\beta = 0$)
Constant	-4.3540	2.4770	0.0394
ln(NSeats)	1.7360	1.0120	0.0431
PrevAppt	-0.2184	0.0715	0.0011
Military	0.4626	0.2258	0.0202
Fresh	5.9000	4.6450	0.1020*
Fresh2	-10.4200	6.5630	0.0562*

NOTE: A test of the hypothesis that all the coefficients are zero (that is, have no effect) is accomplished with a chi-square statistic ($\chi^2 = 18.3$, 5 degrees of freedom). The probability that these results could have occurred if all the population parameters were really zero is 0.0026.

*The probability that the coefficients on Fresh and Fresh(2) could have come from a population where both are really zero is less than 0.05.

Supreme Court appointments is constant over time. On the basis of the variables in equation 2, this expected value varies considerably. For example, an increase in electoral turnover increases Supreme Court retirements. The coefficients on the variables *Fresh* and *Fresh*² indicate that the effect is smaller as the level gets higher. For example, an increase in the percentage freshmen from 0% to 30% will increase the expected number of appointments in a year by $[0.3(5.9 - 10.42 \times 0) = 1.77]$ almost two more justices, other things being equal. However, if the level is already at 30% and increases to 60%, then the number of appointments should increase by $[0.3(5.9 - 10.42 \times 0.3) = 0.833]$ only slightly less than one justice.⁹

Similarly, national and international military conflict (as evidenced by the coefficient on *Military*) results in moderate increases in Supreme Court appointments. There is also evidence that more seats on the high Court lead to more opportunities for presidential appointments.

CONCLUDING REMARKS

In three articles published over the last five decades, scholars have provided interesting and useful *descriptions* of variations in the frequency of presidential appointments to the U.S. Supreme Court. That work has conclusively shown that it was a Poisson process that gave rise to these observed data. It seemed all that was needed was to update these results occasionally. However, previous analysts ran into trouble when they jumped from descriptions to *explanations*. All three implied or stated that their findings indicated that the expected number of appointments was constant over time. They also argued that the frequency of appointments in one year was independent of succeeding years.

This article has demonstrated that these are both spurious conclusions. The data are surely Poisson, but that has little to do with these conclusions: The number of appointments is not independent from year to year, and the expected number of appointments is not constant over time. Indeed, there are interesting systematic relationships in these data that have been missed until now. Supreme Court appointments can be forecast far better if viewed as resulting from a set of explanatory variables than by assuming that they are merely random events. Evidence was provided here that more seats on the Court led to more appointments on average. Also, more appointments are expected in the current period when there have not been many in recent years. Finally, the justices do tend to respond to political change; when there is more political volatility and military conflict, there is a greater likelihood of Court retirements.

Previous scholars were impressed with the possibility that a mathematical model could explain political phenomena such as this. This is a useful statistical finding, but to describe a political process as an essentially random event—even though it is a very special type of randomness—can only add limited information to political explanation.¹⁰ Political scientists are usually interested in explaining systematic variations in the expected value of some dependent variable (the expected number of appointments in this case). That is what is usually meant by “the model” in statistical

research and much formal modeling. In this case, very different substantive implications result from a proper interpretation of mathematical and statistical evidence. Previous research correctly described the process generating the randomness; this article went a step further by identifying the systematic explanations for Court vacancies. Instead of describing Supreme Court appointments as a random process, we can now explain them as a combination of random and systematic factors. Paying more attention to these systematic factors allows us to understand more fully and better forecast this important political phenomenon.

Further research of a more detailed nature could help to answer a variety of other hypotheses about Supreme Court appointments. Data on the individual justices in the Supreme Court could help to answer questions about the effect of health on retirement. A more politically relevant hypothesis is whether or not older justices wait to retire until a president of their political party identification or ideological orientation is in the White House. Since other decisions of the justices are based on political orientations, it is plausible that retirement decisions, when they are voluntary, also depend upon political calculation.¹¹

More generally, the influence of random chance and environmental factors on the success and power of presidents is well respected in the presidency literature (Heclo and Salmon, 1981). Presidents may have varying degrees of personal power (Neustadt, 1980), but individual presidential behaviors are powerfully affected by their environments. Congressional, rather than presidential, elections may well explain influence in Congress; events exogenous to the United States may explain the state of the American economy more than presidential policy; even public approval of presidents seems to be more a function of time and exogenous events than of direct presidential intervention. This situation demands that presidency scholars put more effort into forecasting or at least explaining the political events that make up a president's environment.

NOTES

1. Nearly a third (30.2%) of all justices served as presidential appointees in the executive branch before being appointed to the Court. More than half of these held cabinet-level positions.

2. The Judiciary Act of 1801 set the size of the court at five members, but it was repealed by Congress before any of the six justices left the Court.

3. This is related to an age hypothesis. However, preliminary analyses indicated that the age of the oldest justice had negligible effects on expected vacancies. Deriving a measure of health would be more to the point, but it seems infeasible. One possibility would be to use the number of years from the justices' death, either when that death is observed or demographically expected. The former is deficient on theoretical grounds; using a variable at time t to explain one at time $t - 1$ is always problematic but is particularly so here because of the large amount of noise in the variable. The latter fails because information such as health conditions and demographic information on this specialized a group of citizens is unavailable.

4. Cramer's technical point was that the sum of independent Poisson random variables is also distributed as a Poisson variable (with its mean equal to the sum of the means of the individual Poisson variables).

5. As hinted at above, Ulmer (1982: 115) is most sensitive to, and does provide preliminary tests of, the "number of seats" hypothesis. However, the lack of statistical controls make his results difficult to interpret.

6. The choice of six years is somewhat arbitrary. One year is clearly insufficient and ten is probably too long. This choice was the result of experimentation with several values in between, as well as with a variety of other more complicated lag structures.

7. Actually, each ϵ_t is independently distributed as $[\text{Poisson}(\theta_t) - \theta_t]$, where $E(Y_t) = \theta_t$. Thus $E(\epsilon_t) = 0$, for all t .

8. Since we are probably most interested in the typical case where about one Supreme Court appointment is expected, these coefficients can be interpreted roughly as regression coefficients. The reason is that when an independent variable in an EP regression increases by one unit, the expected value of the dependent variable will increase by the respective regression coefficient multiplied by the previous expected value of the dependent variable: $\theta_t\beta$. Since the average of Y_t is about 1, $\theta_t\beta$ can be interpreted for the *typical* year as β would be in a regression equation. In years when the expected number of appointments is higher, the effect is also higher. See King (forthcoming) for details.

9. This is the standard interpretation of a parabola. The effect of *Fresh* on Y_t is $(5.9 - 10.42 \text{ Fresh})$. This term is then multiplied by the amount *Fresh* is increased (0.3 in the examples in the text).

10. In fact, the first article in this series (Wallis, 1936) is regularly cited in the statistical literature as evidence that the Poisson distribution arises in natural situations (Haight, 1967: 105). This may be of some interest to statisticians and political methodologists, but it is not a point that should be of primary interest to political scientists.

11. There is no omitted variable bias in estimating equation 2, since the variables described in this paragraph are plausibly not correlated with the included variables.

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